[0041] The machine may also be mounted to a second structure, wherein the second structure is arranged on the shaft at the first end of the shaft and attached to the first side of the stator housing, the second structure comprising a first radial bearing on an inner circumferential surface of a hollow portion in the second structure, and the second structure being supported on the shaft by the first radial bearing, the first radial bearing being seated on the shaft at the first radial bearing mounting surface.

[0042] When there is a second structure, the may also be provided a second mount between the first side of the stator housing and the second structure, wherein the mount comprises a mounting surface facing away from the first side of the stator housing, and wherein the second structure is mounted to the mounting surface of the second mount, and the first side of the stator housing is mounted to the mount.

[0043] The second structure may cover or enclose the first rotor. When a second mount is used, the second structure and/or second mount may cover or enclose the first rotor.

[0044] The above-mentioned structures may comprise a portion of an engine of a vehicle or a portion of a transmission system of the vehicle.

[0045] The present invention may also provide an axial flux machine comprising: a stator comprising a stator housing enclosing a plurality of stator bars disposed circumferentially at intervals around an axis of the machine, each of the stator bars having a set of coils wound therearound for generating a magnetic field, and the stator housing having an annular shape forming a hollow region about the axis of the machine; a first rotor comprising a set of permanent magnets and mounted for rotation about the axis of the machine, the rotor being spaced apart from the stator along the axis of the machine to define a gap between the stator and rotor and in which magnetic flux in the machine is generally in an axial direction, and the rotor formed of an annulus and having a hollow central region about the axis of the machine; a second rotor disposed on an opposite side of the stator to the first rotor, the second rotor comprising a set of permanent magnets on a first side of the second rotor facing the stator, the second rotor being mounted for rotation about the axis of the machine and relative to the stator, the second rotor being spaced apart from the stator along the axis of the machine to define an axial gap between the stator and second rotor and in which magnetic flux in the machine is generally in an axial direction; a shaft extending along the axis of the machine and comprising first and second rotor contact surfaces, the first and second rotors being mounted respectively to the first and second rotor contact surfaces; a spacer for spacing the first rotor and stator apart; wherein the first rotor contact surface is axially positioned on the shaft to define the axial position of the first rotor, and wherein the second rotor contact surface is axially separated from the first rotor contact surface to define the axial distance between the first and second rotors and to define the axial airgaps between the first rotor and stator and the second rotor and stator.

[0046] The spacer may be between the first rotor and first side of the stator and in contact with the first rotor and first side of the stator. The spacer may be formed of an annulus with a channel between the inner and outer circumferential portions for receiving the shaft.

[0047] The machine may also be provided with a second spacer in between the second rotor and the second side of the stator, which protects the stator housing and second rotor from damage during transit should the stator be caused to "hop" from its contact with the first spacer on the first side of the machine. The second spacer may have an axial thickness that is greater than a desired air-gap between the second rotor and stator of the assembled machine.

[0048] The spacer in contact with the first rotor may have an axial thickness that is less than a desired air-gap between the first rotor and stator of the assembled machine.

[0049] Alternatively, the spacer may be mounted to a surface of the first rotor that faces away from the stator. This spacer may be formed as an annulus comprising a plurality of spacing portions extending radially from the outer circumference of the annulus beyond the circumferential edge of the first rotor, the spacing portions also extending axially towards the stator, and wherein the spacer portions are in contact with the first side of the stator when installed. The axial length of the spacer portions defines a gap between the stator and the rotor when installed.

[0050] For transit of the machine, the spacer may be attached to the stator to prevent the stator moving around.

[0051] The machine may also comprise a mount to the second side of the stator housing, the mount having a mount surface facing away from the stator housing for mounting the machine to a structure.

[0052] In any of the machines described above, the first and/or second engagement surfaces may comprise splines for engagement with respective shafts.

[0053] Furthermore, in any of the machines described above the stator housing may define a chamber incorporating cooling medium in contact with the coils to cool the coils, the stator housing including a port for supply and a port for drainage of the cooling medium.

[0054] In any of the above machines, the machine is a torque source, a motor or generator.

LIST OF FIGURES

[0055] The present invention will now be described, by way of example of, and with reference to the accompanying figures, in which:

[0056] FIGS. **1***a* to **1***c* show, respectively, a general configuration of a two-rotor axial flux machine, example topologies for axial flux permanent magnet machines, and a schematic side view of a yokeless and segmented armature (YASA) machine;

[0057] FIG. **2** shows a perspective view of the YASA machine of FIG. **1***c;*

[0058] FIG. **3** shows a perspective exploded view of a stator and stator housing for a YASA machine;

[0059] FIGS. **4***a, b* and *c* show assembled axial flux machines installed on other structures;

[0060] FIG. **5** shows the axial flux machine of FIG. **4** using a first type of spacer during assembly;

[0061] FIG. **6** shows the axial flux machine of FIG. **4** using a first type of spacer during assembly;

[0062] FIG. **7** shows the first type of spacer;

[0063] FIG. **8** shows the axial flux machine of FIG. **4** using the first type of spacer during assembly; and

[0064] FIG. **9** shows the axial flux machine of FIG. **4** using a second type of spacer during assembly;

[0065] FIG. **10** shows the axial flux machine of FIG. **4** using a second type of spacer during assembly;

[0066] FIG. **11** shows the axial flux machine of FIG. **4** using a second type of spacer during assembly;

[0067] FIGS. **12***a* and **12***b* show the second type of spacer;